



Ministry for the
Environment
Manatū Mō Te Taiao

Sustainable Government Buildings

**Beyond Design
A Best Practice Approach to
Building Commissioning, Completion
and Ongoing Operation**

**Appendix B: Post-occupancy
Environmental Management Plan**

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1 Introduction

1.1 Application and scope

This environmental management plan (EMP) applies to the [project name], owned by [*owner's name*] and leased by [name of government ministry, department or agency].

The EMP has been developed and agreed between the landlord and tenant and addresses energy efficiency, water efficiency, waste reduction and workplace travel planning associated with the building.

1.2 Purpose

The main purpose of the EMP is to assist the landlord and the tenant to meet their respective obligations under the as-built and in-use ratings of the Green Star NZ rating scheme. The primary objectives are to:

- achieve the required Green Star NZ rating and its associated environmental performance targets
- maintain the required rating and associated environmental performance targets over the term of the lease.

1.3 Principles

This EMP adopts the following four basic principles of effective environmental management.

- Information – This should include consumption data, end-use breakdowns and intensity indices which are essential to understanding how, where and why energy and water are used. Also the amount and waste is generated in the building and how its users travel to work.
- Knowledge – education of and awareness among the building operators and users is necessary to achieve improvements in operation, efficiency and behaviour.
- Action plan – the landlord and tenant must have an action plan of how to achieve and improve on the building's environmental performance, based on the information available.
- Commitment – the landlord, tenant and building's users must openly demonstrate a commitment to environmental management.

1.4 Briefing information

As part of the design process, the design intent has been recorded and a user guide has been provided. This supplies information on the design assumptions, standards, load assessments, building and system descriptions, and operating principles. The guide should be read and understood by the landlord and tenant representatives of the building management committee (BMC) in developing this EMP.

The design intent and building user guide documentation should be appended to this EMP.

2 Building Base Data, Operating Assumptions and Environmental Key Performance Indicators

Table 1: Building base data

Item	Description
Year built	
Last major refurbishment	
Roof and external cladding	
Insulation (roof and walls)	
Glazing and shading systems	
Levels – number of	
Basements levels – number of	
Gross building area (m ²)	
Total net lettable area (m ² NLA)	
Tenancy (m ² NLA)	
External landscaped area (m ²)	
Car parks (external) – number of	
Car parks (basement) – number of	
Non-office areas such as retail (m ² NLA) and main business activity (eg, café)	

Table 2: Operating assumptions and key performance indicators

Item	Description
Operations – central services hours, days, weeks
Operations – tenancy hours, days, weeks
Personnel number of people in the tenancy (average per annum)
Energy-use target kwh/NLAm ² /year
Water-use target litres/NLAm ² /year
As-built Green Star NZ rating stars

3 Stakeholders

This Plan recognises that there are a number of stakeholders involved in achieving, maintaining and improving the environmental performance of the building. It addresses the need to understand the requirements of each, how they are best met, and the impact of their requirements not being satisfied.

Table 3 lists these stakeholders, defines their stake(s) or interest(s) in the building that impact on environmental performance, and the impacts they might have on achieving the required outcomes required (both positive and negative), plus appropriate responses.

Table 3: Stakeholders: their interests, impacts and required responses

Ref	Stakeholders	Objectives for or interest in environmental management	Likely impact on efficiency and/or usage levels	Response(s) required
1	Landlord	Future-proofing asset Tenant satisfaction Longer lease term Enhanced building rental and valuation	High	Ensure the building performance specification is delivered, any remedial works required are actioned, and the building is correctly commissioned, operated and maintained.
2	Tenant	Lower operating costs and environmental impacts Government commitments (Govt*) Improved user satisfaction and productivity	Medium	Ensure the hard and soft fit-out design and equipment do not compromise the base building environmental performance. Make sure occupants use the building as intended.
3	Occupants	Comfort, ease of use Amenity and user satisfaction	High	Encourage sustainable behaviours by occupants.
4	Facilities manager	Minimise operating costs Maintain building asset value Maximise tenant satisfaction	High	Operate and maintain the building correctly and efficiently.
5	Contractor(s)	Complete project on time, on budget and to required quality, with minimum call-backs	Low, provided they have done their job properly.	Ensure project is properly completed, tested and commissioned and defects are cleared.
6	Designers	Meet or exceed design intent predictions, in terms of environmental performance	High for first year only, provided they have done their job properly.	Communicate the design intent and sustainable use of the building and involvement in the first-year fine-tuning process.
7	Cleaning contractor	Daytime cleaning possibilities to reduce energy use Improvements to indoor air quality	Medium	Minimise the cleaning period and associated energy use. Adhere to waste management principles. Use environmentally friendly cleaning materials.
8	Electricity supplier	Use of electricity as an energy source Reductions in peak demand	Low	Ensure tariffs are competitive and encourage demand reduction.
9	Gas supplier	Use of gas as an energy source and reduction in peak demand.	Low	Ensure tariffs are competitive and encourage demand reduction.

4 Key Actions and Responsibilities

4.1 Key actions

Key actions required by the Environmental Management Plan (EMP) are summarised in Table 4.

Table 4: Schedule of key actions

Ref no.	Description	By	To	Due
1	Form building management committee and appoint environmental representatives	Landlord + tenant	Other party	Within 14 days of commencement date
2	Environmental management plan	Landlord + tenant	Building management committee (BMC)	Within three months of completion, then review every two years
3	Maintenance contracts	Landlord	Maintenance companies	Within three months of completion
4	Energy, water and waste data reports	Landlord + tenant	Other party	Within 14 days after each calendar month
5	Post-occupancy evaluation	Expert	BMC	Six months after completion and then three-yearly
6	EMP performance report	Landlord + tenant	Other party	Within three months of each anniversary of commencement date
7	Remedial plan	Either party	Other party	Within 15 working days of remedial notice
8	Green Star NZ accreditation rating	Expert	Landlord + tenant	12 months after completion
9	Triennial building audit	Expert	Landlord + tenant	Every three years

4.2 Building management committee responsibilities

A building management committee shall be established, with representatives from the landlord, tenant and facilities manager. During its first-year establishment phase, the committee shall be supported by representatives of the designers, contractor and commissioning agent.

Table 5: Responsibilities of the building management committee under the Environmental Management Plan (EMP)

Ref	Item and frequency
	Quarterly
1	Review energy use, water use and waste production.
2	Review the energy, water and waste reduction strategies good practice checklist – are there any outstanding issues?
3	Update progress on the implementation of agreed improvement strategies.
4	Provide notice of any upcoming change that may affect environmental performance (eg, staff increases, after-hours usage or planned fit-out changes).
5	Contract review – are there any contracts coming up for review that impact on energy performance (eg, cleaning, maintenance)?
6	Policy review – are any new policies being introduced that impact on environmental performance (eg, work from home policy, travel, occupational health and safety)
	Annually
1	Compare energy, water and gas usage and waste generation and disposal with previous years. Is there any significant change? Did it meet improvement targets (if relevant)? Does usage trend up or down? Is this an issue?
2	Tariff review – is the current tariff still appropriate based on the previous year? Does it need to be renegotiated/adjusted?
3	Strategic planning – look at priorities to address in the future (e.g. in relation to amending policies and contracts, communications activities, set and revise consumption targets).
	Triennially
1	Conduct building three-yearly building audit. The audit shall be carried out by an independent consultant(s) who shall report to both the building owner and the tenant concurrently. This shall review the condition and performance of the building in relation to the requirements and performance measures of the building performance specification(BPS). The review shall also include all tenancies and any impact of any subsequent fitting out work since completion or the last audit. The need for any corrective actions such as partial re-commissioning to restore operational performance shall be identified.

4.3 Landlord's responsibilities

The landlord's responsibilities in achieving the required environmental outcomes are outlined in Table 6.

Table 6: Landlord's responsibilities under the Environmental Management Plan (EMP)

Landlord management	Considerations for Building Management Committee	Information sources	Review frequency
Arrange for building operating staff to attend training before handover by contractor.	–	Programme from contractor and commissioning agent	–
Confirm receipt of all building documentation, including design intent, commissioning report, O&M manuals, as-built drawings, user guide and code compliance certification, and warranties.	–	Delivery by commissioning agent and builder	–
Appoint representative to building management committee (BMC).	–	–	–
Tender/appoint facilities management staff and maintenance/cleaning/waste management contractors.	Review	–	Review as required by contract duration
Based on advice from the BMC, review any non-performance against environmental performance targets, sanction any remedial works required by the landlord, and advise of any remedial works required by the tenant.	Review information and summarise required actions	Energy, water and waste and indoor environmental quality IEQ reporting	As required
Confirm clearance of defects at the end of the defects period and final payment of contractors.	Provide fault reports for action by builder	Advice from professional team and builder	–
Maintain indoor environmental quality.	Implement indoor environmental quality strategies	Specific indoor environmental quality strategies	From occupation
Arrange for warrant of fitness inspections and certification.	–	Expert inspections and certificates	Annually
Make annual inspections of tenant areas and advise owner of any areas of non-compliance.	Review for any environmental impacts	Inspection reports	Annually
Set-up sinking fund for plant and system upgrading and replacement.	–	–	–
Review triennial building audit and sanction any remedial actions required by the landlord.	Review report and summary required actions	Expert report	Three-yearly
Review and sanction significant tenant alterations and re-fits.	Review for any environmental impacts	Tenant fit-out proposals	As required

4.4 Tenant responsibilities

The tenant's responsibilities in achieving the required environmental outcomes are outlined in Table 7.

Table 7: Tenant responsibilities under the Environmental Management Plan (EMP)

Tenant management	Considerations for Building Management Committee	Information sources	Review frequency
Faults	<p>Monitor faults for likely issues that impact on environmental performance.</p> <p>Ensure that fault reports are reviewed, and faults actioned that effect environmental performance.</p> <p>Report lighting faults promptly.</p> <p>Monitor tenant fault report for heating, ventilation and air-conditioning (HVAC) (eg, air temperature issues).</p>	<p>Tenant fault reports</p> <p>Maintenance reports</p> <p>Building owner fault reports</p>	<p>Quarterly or as required</p>
Staff levels	<p>Establish an acceptable range.</p> <p>Monitor staffing levels within the acceptable range.</p> <p>Note: the number of employees has a direct impact on energy use.</p>		<p>Commencement of lease within first three months</p> <p>As required</p> <p>As required</p>
Fit-out changes	<p>Consider the impact of fit-out changes on environmental performance.</p> <p>Note any impact on comfort levels as well.</p> <p>Includes partitions.</p> <p>Note the impact on HVAC.</p> <p>Building owner's approval is required for any hard fit-out changes.</p>	<p>Refer to fit-out design brief</p> <p>Mechanical engineer report</p> <p>Approve plans by building owner</p>	<p>As required</p> <p>As required</p> <p>As required</p>
Equipment	<p>Consider the impact of equipment numbers (eg, computers, fridges).</p> <p>Give preference to energy-efficient equipment with energy-saving modes.</p> <p>Liaise with information technology administrator to ensure stand-by function and/or energy saving is enabled.</p> <p>Monitor information technology updates.</p> <p>Consider and review the impact of requests for bar fridges, drinks-vending machines, etc on energy performance.</p> <p>Note: the number of computers and appliances has a direct impact on energy use.</p>	<p>Liaise with IT administrator</p>	<p>As required and when purchasing</p>
Lighting	<p>Ensure that lighting system controls are functioning as designed.</p> <p>Review operating times.</p> <p>Are out-of-hours operations, including automatic switching overrides and sensor controls, working?</p>	<p>Check commissioning report</p> <p>Maintenance reports/ staff feedback</p> <p>Maintenance reports</p> <p>Review fault reports</p>	<p>Commencement of lease/before default period expires</p> <p>Quarterly</p> <p>Quarterly</p> <p>As required</p>
Controls	<p>Do not adjust unless labelled as okay to adjust. Submit request to facilities manager.</p>		

Tenant management	Considerations for Building Management Committee	Information sources	Review frequency
Non-authorized equipment	Unauthorized use of radiators, toasters, fans and other non-authorized appliances.	Inspect regularly Check 30-minute electricity data	Annually Quarterly
Vents	Do not obstruct vents.	Building inspection reports Maintenance reports	Annually Quarterly
Water	Implement water conservation strategies.	Water reduction strategies	Within six months of occupancy
Workplace travel	Implement a tenant workplace travel plan. Integrate with other tenants.	Land Transport New Zealand Workplace Travel Plan Co-ordinator's Guide	Within six months of occupancy
Waste	Implement waste minimisation strategies.	Specific waste reduction strategies	Within six months of occupancy

5 General Environmental To achieve the required outcomes, the following strategies shall be adopted.

1. Implement training for key stakeholders and facilitate access to project information and feedback on performance.
2. Appoint landlord representative and the tenant representative to a building management committee (BMC) and require them to be environmental champions (ie, openly demonstrate leadership of and commitment to environmental performance).
3. Develop an EMP with key strategies to achieve energy, water, waste and workplace travel-planning targets.
4. Measure and make all consumption, key performance indicators, cost and end-use data readily available to facility managers, operators and the building management committee.
5. Develop a communications strategy and awareness campaign, with regular reporting to tenants/occupants on building environmental performance. Identify unacceptable behaviours and work practices and define required behaviours, relevant barriers and incentives to achieve the required cultural, behavioural and system changes.
6. Assess any building and fit-out changes for their potential environmental impact.
7. Have formal mechanisms for gathering feedback from tenants and facilities management.
8. Adopt a process of continual improvement.

6 Specific Energy-use Reduction Strategies

6.1 Strategies for reducing energy use

1. The building systems and plant operation, including all energy-saving strategies, shall be fine-tuned during the first year of operation.
2. The landlord shall undertake monthly energy meter readings and identify end uses and any trends in relation to targets.
3. The landlord shall establish procedures for energy efficiency and conservation.
4. The landlord and tenant shall initiate quarterly surveys of after-hours energy use of common areas and tenancy to identify lights, plant and equipment left on unnecessarily.
5. The landlord's maintenance and cleaning contracts shall include performance clauses encouraging contractors to help achieve the required performance target.
6. The landlord and tenant shall regularly review the operating schedules of the building systems and plant, and the need or otherwise for after-hours operation.
7. The landlord and tenant shall review the impact of cleaning on energy use and ensure there is no undue wastage of energy. Where practical, the landlord and tenant shall encourage daytime cleaning.
8. The landlord and tenant shall implement communications and education strategies for stakeholders.
9. The tenant shall enable energy saving/sleep routines for computer equipment.
10. The tenant shall select equipment and appliances on the basis of energy efficiency.
11. The landlord shall ensure the building operates in accordance with the design intent and building performance specification.
12. The landlord shall ensure regular maintenance and re-calibration of building services.
13. The landlord shall ensure regular cleaning of windows and blinds.
14. The landlord and tenant shall put up signs for users and cleaners to turn off lights after use.

6.2 Energy consumption targets

Energy use and carbon dioxide emissions key performance indicators in kWh/m²NLA/year and kg/m²NLA/year shall be used (see Table 8). Performance shall be determined and reported monthly by recording actual consumption in relation to targets. If it appears that the target energy consumption and carbon dioxide emission targets are not being achieved, then the landlord and tenant shall identify all reasonable measures needed to achieve the target. Where feasible, energy-saving measures shall be delivered in the timeframe required to achieve the target.

Table 8: Target, actual and forecast monthly consumption for rating period

Month/ year	Target kWh/month (kg CO ₂ /month)				Actual and forecast kWh/month (kg CO ₂ /month)					
	Tenancy		Whole building/ central services		Total	Tenancy		Whole building/ central services		Total
	Electricity	Gas	Electricity	Gas		Electricity	Gas	Electricity	Gas	
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
Year										

7 Specific Water-Use Reduction Strategies

7.1 Strategies for reducing water consumption

The landlord shall:

- undertake monthly water audits
- establish procedures for water efficiency and conservation
- establish mechanisms for the timely reporting and rectification of water leaks, and report performance annually
- sub-meter all major loads and/or end uses (more than 15% of the total), especially cooling towers and non-office uses
- monitor and analyse meter data on water time of use to identify inconsistencies
- require cleaners and security personnel to report leaking taps, urinals and toilets
- ensure the building operates in accordance with the design intent and building performance specification.

In addition:

- the landlord's maintenance contracts shall include performance clauses encouraging subcontractors to help achieve the required performance target
- the landlord and tenant shall implement a communications and education strategy for stakeholders
- cleaning contracts shall specify relevant cleaning and maintenance procedures for specialist 'green' products, such as waterless urinals, where used
- indoor planting is to be selected for low water use
- the landlord and tenant shall provide signs to encourage water-saving practice.

7.2 Water consumption targets

A water-use key performance indicator of kL/m²/year shall be used based on net lettable area (NLA). Performance shall be determined and reported monthly by recording actual consumption and NLA figures in relation to targets. If it appears that the target water index will not be achieved, then the landlord and tenant shall identify all reasonable measures needed to achieve the target. Where feasible, water-savings measures shall be delivered in the timeframe required to achieve the target.

Table 9: Target, actual and forecast monthly consumption for rating period

Month/ year	Target kL/month			Actual and forecast kL/month		
	Tenancy	Whole building/ central services	Total	Tenancy	Whole building/ central services	Total
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
Year						

8 Specific Waste Reduction Strategies

8.1 Strategies for reducing waste

1. After six months a waste audit shall be carried out and thereafter annually.
2. The landlord and tenant shall set targets and develop and follow effective waste management systems and procedures.
3. The landlord shall provide separate facilities to receive reusable, recyclable, compostable and landfill-type waste and ensure correct disposal by contractors. Secure document destruction contractors shall process waste to recycling, not landfill.
4. The tenant shall use its best endeavours to put in place recycling arrangements for office computers, fax machines, printers and photocopiers.
5. The landlord's waste services contracts shall include performance clauses encouraging subcontractors to help achieve the required performance target.
6. Landlord's and tenant's cleaning contracts shall specify compliance with waste management policies.
7. The tenant shall pre-sort its waste and use the correct waste receptacles.
8. The tenant shall adopt a green purchasing policy in relation to office paper and consumables: use paper with high (60% or more) post-consumer recycled content, and use re-manufactured/refilled toner cartridges for printers and photocopiers.
9. The tenant shall recycle copier and printer paper for the production of draft documents and encourage paperless office principles and double-sided printing as a default.
10. The landlord and the tenant shall establish mechanisms for the timely reporting of waste reduction measures and performance against targets.
11. Signage shall be provided by the tenant to remind staff to recycle and minimise wastage.
12. The landlord and tenant shall minimise waste during fit-out, alterations and major refurbishment works.

8.2 Waste reduction targets

Baseline waste production was determined as [X] tonnes per year for common areas and [Y] tonnes per year for the tenancy within six months of the commencement date as required. The BMC agreed a [insert target %] waste reduction target and the landlord and the tenant will use their best endeavours to achieve this target.

The waste reduction target and the sum of actual and remaining target waste production levels will be used to determine the average savings needed for each of the remaining months in the assessment period to achieve the target. If it appears that the target will not be met, then suitable reduction measures will be identified and delivered in a timeframe required to achieve the target.

Table 10 summarises the common waste types and target production levels. The agreed waste stream sorting and disposal arrangements are [describe].

Table 10: Summary of site waste streams

Waste stream type	Quantity (tonnes per annum)
White paper	
Other paper	
Plastic	
Glass	
Metal	
Other inorganic	
Organic	
Total	

9 Specific Indoor Environmental Quality Strategies

The tenant shall undertake post-occupancy evaluation six months after completion, and shall provide a copy of the evaluation report to the landlord to assist in building fine-tuning.

The landlord shall carry out regular carbon dioxide monitoring using building management system (BMS) provisions.

The landlord shall test HVAC systems regularly for contaminants and carry out regular indoor air quality tests.

The landlord shall change filters in accordance with suppliers' recommendations (pressure drop) and replace with equivalent grades.

The landlord's maintenance contracts shall specify that all paints, sealants and adhesives are no or low-emission.

The landlord shall monitor and maintain indoor temperature at set summer and winter ranges.

The landlord's cleaning contracts shall specify the use of natural, solvent-free and hydrocarbon-free cleaning products. Cleaning equipment with high efficiency particulate arrestor (HEPA) filters shall be used and there shall be regular auditing of cleaning equipment.

The landlord shall clean lights periodically to remove dust build-up and replace lamps when maintained illuminance levels are not being met.

No herbicides, fungicides, insecticides or pesticides shall be used on indoor plants.

10 Specific Hard and Soft Fit-out Changes Strategies

The tenant shall re-use existing furniture and modular partition systems, doors, ceilings and joinery wherever practical.

Where new furniture is required, the tenant shall select environmentally preferable products with certification as appropriate.

The tenant shall select water- and energy-efficient equipment and appliances.

The tenant shall continue to use low-emission paints, finishes and adhesives.

The tenant shall selectively replace carpet tiles and encourage recycling/re-manufacture of existing tiles.

The landlord and tenant shall ensure any associated HVAC, lighting, water and electrical changes associated with re-fitting are consistent with energy, water and indoor environmental quality Indoor Air Quality strategies and the original design intent.

The tenant shall ensure that any refitting is consistent with the waste management strategy.

11 Specific Workplace Travel Planning Initiatives

The tenant shall appoint a workplace travel plan co-ordinator and working group who shall:

1. Develop a scope and budget for travel plan development and maintenance.
2. Set objectives for each aspect of the travel plan, and develop improvement measures.
3. Obtain senior management support and commitment.
4. Carry out a staff travel survey to determine current travel patterns and behaviours. Take into account number of staff employed, number of visitors and number of deliveries.
5. Set targets and co-ordinate the plan with Govt³ initiatives.
6. Develop a package of site-specific measures promoting sustainable travel.
7. The travel plan shall cover:
 - information, training and advice
 - commuting
 - business travel
 - supplier travel
 - visitor travel
 - working arrangements.
8. The travel plan shall provide commuting initiatives such as:
 - car sharing
 - cycling and walking
 - preferential parking for car sharers and environmentally friendly vehicles
 - public transport season ticket loans
 - energy-efficient, small and more environmentally friendly vehicles
 - spaces and changing facilities for motorcycles, mopeds and cyclists.
9. The travel plan shall provide business travel initiatives such as:
 - video conferencing
 - telephone conferencing
 - offsetting carbon from official air travel
 - use of car hire and taxi companies that have high environmentally friendly vehicles.
10. The travel plan shall investigate ways to minimise the number of supplier visits in particular postal services and waste collections.
11. The travel plan shall provide visitor travel initiatives such as electronic and hard copy maps which identify public transport opportunities and publicise facilities available for disabled visitors.

12. The travel plan shall provide flexible working initiatives such as:
 - reducing travel during peak hours
 - job-splitting and sharing
 - compressed hours
 - home working.
13. Review and undertake annual surveys to measure progress against targets and review the travel plan and identify any new issues.
14. Develop a communications strategy to communicate annual achievements of travel planning. Initiatives might include an intranet and internal publicity.

12 Risk Management

Both the landlord and the tenant face risks in meeting their obligations relating to the environmental key performance indicators and the associated Green Star NZ rating. These risks are acknowledged in Table 11 below, and the suitable mitigation measures should be developed as identified by this plan and the preceding design and construction management processes.

Table 11: Risk schedule

Risk description
Poor design practices
Poor contractor practices
Poor tenant work practices
Poor system commissioning
Poor facilities management practices
Increased occupancy levels
Increased working hours
Increased energy intensity of office equipment
Fit-out changes adversely impacting on original design
Small groups working outside business hours
Lack of champions in senior management of landlord and tenant
Maintenance contracts lack effective incentives